Marine Corps Research Topic Proposals

Marine Corps University, Quantico Virginia

Direct **Point of Contact** information for each of these research topic proposals can be obtained from an MCU Faculty Advisor/Mentor, or from a Reference Librarian at the Gray Research Center. You may contact a Reference Librarian in person at the Gray Research Center, or by calling 703-784-4411 (DSN 278).

These research topic proposals span the tactical, operational and strategic levels of warfare. Students selecting a research topic from these proposals should choose one relevant and appropriate to their specific school or college. All MCU student research topic proposals should be approved by a Faculty Advisor/Mentor prior to beginning in-depth research and writing on the topic.

HQMC Programs and Resources

Commercial: (703) 614-3527 DSN: 224-3527

1. **How does the Marine Corps address Force Modernization in a Stressed National Economy?**

2. **What is the best way to equip the Marine Corps for the least probable war while fighting the most probable war?**

HQMC Aviation

1. Optimization of USMC Airborne Platforms

Commercial: (703) 693-3477 DSN: 224-3477

Description: Analysis of possible Marine Corps use of airborne platforms in support of communications and command and control. *(future warfare, strategy and operations, joint operations, irregular warfare, enhanced company operations)*

Rationale: Airborne platforms have proliferated the battlespace and optimized use of these platforms to execute command and control has significant room for improvement. Each airborne platform that is in the Marine Corps inventory, or fly's in support of USMC Operations should maximize it's payload for battlespace video, communications relay, and aerial reconnaissance in support of distributed operations in support of Expeditionary Maneuver Warfare and Counter Insurgency Operations.

Specifically, how does the Marine Corps make use of the unique attributes of airborne platforms to extend connectivity to Marines conducting expeditionary operations? What might be done with existing platforms without reducing the amount of air fires currently available? What changes in doctrine and planning might be needed to support such new uses? How can the Marine Corps make use of other Service's new capabilities? Researchers may address all or portions of this topic area but should be guided by the Marine Corps' Strategy and Vision.

Marine Corps Combat Development Command

1. Lighten the MAGTF

Commercial: (703) 784-2415 DSN: 278-2415

Description: After six years of largely static combat in Iraq and with increasing demands for battlefield mobility as the Corps transitions into Afghanistan and back to service afloat, the Marine Corps must markedly lighten the expeditionary load. As we refit and reconstitute, nearly every piece of gear—from aircraft, to vehicles, to individual combat equipment—is heavier than the gear it replaces. Aboard ships, our current heavy footprint threatens to exceed gross displacement before we exceed cubic feet of storage. In Afghanistan, we must focus on retaining speed with respect to an enemy who is lighter, more mobile, and thus faster. Throughout this analysis one must recognize and accept the inherent need to accept risk when it yields gains in mobility and increased mission capabilities.

How does the Marine Corps lighten the MAGTF in order to retain its ability to be fast, austere, and lethal? The focus should be on three distinct yet interconnected themes: tactics, techniques, and procedures (TTPs), material, and equipment.

1. TTPs: What tactical exigencies require a lighter force? Do tactics, the decisions we make about fighting an opponent, shape the requirements of the fighting load? Does the way Marines think about fighting require a lighter force? How does a road-bound, heavy force adapt to fighting on the ground? How can the institution correct an over-arching internal focus (force protection) for one of an enemy-focused, mission-oriented protective posture? How should the Marine Corps adapt pre-deployment training and TTPs used in theater to both make the force lighter and capitalize on their increased speed? Recognizing that speed is relative to time and enemy, can mobility realized by a lighter force offer increased protection and lethality? Conversely, if our enemy were mechanized, would we press for a lighter force? What is the role of the commander in deciding how we fight?
2. Material: Are we at the point of diminishing returns? Some Science and Technology (S&T) sources caution us that any significant weight savings through new materials are 10-15 years off at the earliest; we will not be able to realize any appreciable benefits to the warfighter in the next generation of vehicles or gear. Should additional—yet scarce—monetary resources be directed to the S&T fields in an effort to accelerate these new technologies?
3. Equipment: How can our vehicles and individual combat equipment get lighter and in many cases, smaller? (For example, a Medium Tactical Vehicle Replacement will not fit in lower vehicle ramp of *San Antonio*-class ships.) Should new vehicles be constructed in a modular fashion to maximize crew safety while increasing mobility but sacrificing some vehicle integrity? (JLTV original design was for 12,500 lbs gross vehicle weight; some industry prototypes were 23,000 lbs.) How will the increased size and weight of every T/M/S of aircraft affect amphibious shipping and austere airfield environments?

CAOCL/MCIA Topics of Interest

1. Understanding "Marine"

Commercial: (703) 432-1448 DSN: 378-1448

Description: The Commandant's *Vision and Strategy 2025* states: "We seek to concentrate our strength against enemy weakness, exploiting his critical vulnerabilities while minimizing and protecting our own." Within USMC, we study different cultures by examining the physical environment, economic conditions, social and political structures, beliefs and symbols, and history to develop an understanding of the place and people we will encounter and ensure our Marines can navigate the complex environments effectively to achieve U.S. national security objectives on the ground. It goes without saying that the enemy is studying us as fiercely as we are studying them. What will they find? What will they try to exploit?

Rationale: Examine the culture of Marines and Americans and strategize how to provide the Marines the understanding of self so that they are unpredictable to the enemy and can minimize/protect their vulnerabilities on the ground. In culture, sometimes an admirable characteristic can be used against us, so do not limit discussion to the "negative."

2. The Coalition Force – An exercise in cross-cultural cooperation

Commercial: (703) 432-1448 DSN: 378-1448

Description: In the Marine Corps, we have our own culture, our own way of doing business. Besides the other U.S. military services, the Coalition Force involves countries and organizations with whom we may not work routinely, and thus, we may be unfamiliar with their culture and how they do business.

Rationale: Understanding the cultural orientation of ourselves and our coalition colleagues is key to our success on the ground. Discuss why this is so. Also, drawing from your professional experience, discuss how effectively we have navigated these cultural waters. Make recommendations on how we can improve.

3. Culture and Language – the Seventh Warfighting Function?

Commercial: (703) 432-1448 DSN: 378-1448

Description: The importance of cultural awareness and language familiarization has been prominently figured in USMC recent strategic documents, *Vision and Strategy 2025* and the Long War Concept, and recognized as a significant tool in the Marine toolbox for effectively carrying out Marine missions globally.

Rationale: How do we ensure Marines use this tool to their best advantage? How do we ensure that culture and language are integrated into operational and strategic planning? A warfighting function "helps [planners] achieve unity of effort and focus." Would establishing culture and language as a seventh warfighting function ensure that Marines integrate culture and language into all operational and strategic planning? Argue for or against this idea, drawing from your professional experiences.

CAOCL/MCIA

1. Cross-Cultural Interaction

POC: Command Social Scientist
Commercial: (703) 432-7333 DSN: 378-7333

Description: In any planning, Marines must consider not only the terrain and enemy capabilities but also their own capabilities. Planning is about understanding how these elements may interact in the battlespace. Similarly, accounting for socio-cultural factors is not really about understanding "the other" (the enemy, the local population, etc.), but rather about understanding the interactions between U.S. forces, coalition partners, local people, and others who are influencing the area of operations. It is about understanding American and Marine assumptions as much as it is about local culture. Much of the material on this topic currently available to Marines focuses on direct contact, how different assumptions on the part of Marines and locals about meetings and negotiation can lead to unexpected outcomes. However, the need to anticipate problems and opportunities in cross-cultural interactions goes beyond direct contact, affecting a broad range of planning and operational questions. Differences between Marine and local messaging frames and narratives impact information operations. Different perceptions about the value and effect of infrastructural improvements, such as to schools or clinics, impact civil affairs and engineering. Different assumptions about ownership and land use rights affect logistics.

Specific Questions: What are the most critical aspects of planning and operations where differing assumptions can affect outcomes? What are examples of situations where Marines (or others) have successfully leveraged points of cross-cultural resonance or anticipated a source of friction? What are examples of failures? How can the planning process be improved to account for all sides of the cross-cultural interaction? What education, training, and/or support products and services are needed to assist Marines in successfully building and using knowledge of all sides of cross-cultural interaction?

2. Impact of Cultural Factors on Operational Planning in Africa

POC: AFRICOM Desk Officer
Commercial: (703) 432-1745 DSN: 378-1745

Description: Culture factors can significantly impact operational outcomes. Cultural factors include, but are not limited to, traditional beliefs, traditional warfighting, religious obedience, economic challenges/lack of resources, family lineage, clan/ethnic loyalty, civil-military relationships, political structure and stability (or instability), and regional military and political relationships. These require our attention as operational planners and executers to ensure that we achieve mission success.

Rationale: Examine the cultural factors specific to a country or region in Africa that a U.S. Joint Multinational Task Force needs to consider when planning and executing multi-national military operations (counterinsurgency, security cooperation, noncombatant evacuation, and disaster relief support) in collaboration/liaison with African military armed forces. Include how these cultural factors impact African military planning and decision-making processes and the functioning of African armed forces' chain of command in your discussion. Specific countries of interest include: Morocco, Tunisia, Algeria, Senegal, Niger, Mali, Cameroon, Benin, Mauritania, Chad, Rwanda, Kenya, Ghana, Tanzania, andSouth Africa.

3. Cultural Impediments to Training African Militaries

POC: Command Social Scientist
Commercial: (703) 432-7333 DSN: 378-7333

Description: The Africa Contingency Operations Training and Assistance (ACOTA) Program, managed and funded by the Department of State, is an initiative designed to improve African

ability to respond quickly to crises by providing selected militaries with the training and equipment required to execute humanitarian or peace support operations. Currently over a dozen African countries receive ACOTA training, some of which is provided by U.S. Marine Corps personnel.

Specific Questions: What have been some of the key cultural barriers to maintaining the training operational tempo, developing a student-teacher rapport, developing capacity, and professionalizing the force in accordance with the training objectives? What methods have U.S. instructors employed to overcome some of these cultural barriers and how effective are they?

4. Operation Shining Express – Cultural Impediments to Military Operations in Liberia

POC: Command Social Scientist
Commercial: (703) 432-7333 DSN: 378-7333

Description: In June 2003, fighting in Liberia intensified to the point that the U.S. State Department requested military assistance in reinforcing the Embassy and assisting with the departure of U.S. citizens. Eventually, U.S. forces, led by the U.S. Marine Corps, facilitated the deployment of Economic Community of West African States (ECOWAS) peacekeepers to restore order.

Specific Questions: What difficulties did U.S. military personnel encounter when dealing with the local civil populace because of cultural differences? What staff coordination issues resulted from cultural differences between ECOWAS military personnel and U.S. military personnel during the transition to ECOWAS assuming the peace keeping operation? What lessons learned did U.S. military personnel bring back from this experience? Discuss whether you find these lessons learned incorporated into operational planning. Also, how can we apply these lessons to other peace keeping operations in Africa?

5. Regional impact of South Sudanese secession in 2011

POC: Command Social Scientist
Commercial: (703) 432-7333 DSN: 378-7333

Description: South Sudan is scheduled to vote in 2011 on whether or not to secede. More than likely it will vote yes on this issue.

Specific Questions: If so, what will be the most likely, least likely, and most dangerous outcome? What are the prospects for neighboring states to be drawn into a renewed civil war, and what are their interests? What potential missions may the U.S. Marine Corps be called upon to respond to as a result?

6. A New Strategy for U.S. military engagement in Latin America?

POC: SOUTHCOM Desk Officer
Commercial: (703) 432-1728 DSN: 378-1728

Description: ADM Mullen, Chairman of the Joint Chiefs of Staff, visited South America during the week of March 2-6, 2009 and stated, “U.S. military-to-military engagement in Latin America will require a change in thinking and in the culture within the armed services.” He emphasized that the United States has to rid itself of the vestiges of the Cold War to be effective in dealing with Latin America and that Americans have been accustomed to looking east and west rather than north and south.

Rationale: Discuss current U.S. military thinking with regard to Latin America, what this new strategy should look like, and the impact on the U.S. Marine Corps. Also, explore what hinders military planners in making this change and how to overcome that.

7. The Need for a New Strategy with Brazil?

POC: SOUTHCOM Desk Officer
Commercial: (703) 432-1728 DSN: 378-1728

Description: The area known as the "dog's head" in the border region between Brazil and Colombia is a hotbed for drugs and guerrillas. Efforts by the Colombian Armed Forces, especially the Colombian Marine Corps, against the guerilla group, the Revolutionary Armed Forces of Colombia (FARC), have pushed an unknown number of FARC's members across the border into Brazil, from where they are possibly operating. The Brazilian Navy recently elevated its Marine Corps presence in the region up to the full Battalion level.

Rationale: Discuss the current state of relations between the U.S. Marine Corps and the Brazilian Marines and whether there is a need for a new strategy for U.S. Marine Corps engagement in Brazil. Also discuss how a strengthened relationship with the Brazilian Marines could enhance the U.S. Marine Corps state of readiness for future engagements.

Marine Corps Warfighting Lab

1. Littoral Combat Ship (LCS) Modules to support future USMC

POC: Research Fellow, MCWL/CETO
Commercial: (703) 432-0755 DSN: 378-0755

Description: This proposal has application to several areas of study to include: future warfare, joint operations, and amphibious operations. As the Marine Corps looks to the future and how it will be able to use emerging technology and available naval platforms to conduct expeditionary operations, the potential role the Navy's new Littoral Combat Ships could play in future operations needs to be examined. The Navy is currently planning to build 55 of this class of ship which will be designed to carry different/interchangeable modules depending on its current mission. The ship is being specifically designed to operate in the littorals and has the potential to support a wide variety of USMC related missions in support of distributed MAGTF operations.

Rational: The LCS is the only navy ship currently being designed to operate in relatively shallow water and with modules to support a variety of operations. As such this ship with the appropriately designed module(s) has the potential to support a myriad of evolving USMC concepts of operations including Distributed Operations, Sea Basing, etc.

Questions to be explored: How can currently planned LCS modules be used to support USMC warfighting functions and future operations?

What new modules (such as a "manpower module" or "fire-support module") should be developed to support specific missions?

What is the best way to interface the LCS (and accompanying USMC modules) with other planned MAGTF support vessels (i.e., amphibious ships, MPS (F), etc.) of a Sea Base?

2. Adequacy of Infantry Battalion Table of Organization (T/O) and Table of equipment (T/E) to support Enhanced Company Operations (ECO) on future complex and distributed battlefields.

Commercial: (703) 784-4299 DSN: 278-4299

Description: Combat operations in Iraq and Afghanistan have demonstrated the requirement for tactical formations to operate across multiple battlefield functions and increasingly large areas of operation. These operations have also been Forward Operating base-centric and non-expeditionary in nature. You could argue that our success in a mature theater has lulled us into a false sense of security. The Marine Corps Warfighting Lab is currently conducting a series of

ECO limited objective experiments designed to increase the rifle company's overall capability, across the full range of military operations. The unanswered question is how effectively a dated infantry battalion headquarters T/O and T/E will support these formations in expeditionary environments.

We must look beyond current operations. On expeditionary, even seabased, battlefields described in CMC's Vision & Strategy 2025, the ability of higher headquarters to support highly capable and wide-ranging tactical formations will be critical to mission success. Intuitively, current T/Os and T/Es are not equal to the task.

Rationale: ECO experimentation is carefully examining logistics, fires, and command and control improvements at the company level. Additionally, MCWL is developing an experimental rifle company T/O. At this early stage, experiment planners would benefit greatly from an equivalent study at the battalion level, by experienced field grade officers and other subject matter experts. Specific to logistics, the Corps is experiencing the development of unmanned air and ground systems. Questions must be answered prior to fielding. Where are these systems resident? Are their employment and maintenance supported by current T/Os? Can the S-4 (Logistics), as currently manned and equipped, support enhanced companies? The same questions can be asked of the S-2 (Intelligence), S-3 (Operations and Training), and S-6 (Command and Control).

3. Unmanned Systems Required to Support Future USMC Operations

POC: Research Fellow, MCWL/CETO
Commercial: (703) 432-0755 DSN: 378-0755

Description: This proposal has application to several areas of study to include: future warfare, joint operations, and amphibious operations. As the Marine Corps looks to how it will conduct expeditionary operations in the future, the potential contributions to be made by various types of unmanned systems needs to be closely examined. The Marine Corps was instrumental in the development of unmanned aerial systems and their tactical/operational employment. However, to date there has been little effort given to examining the potential role that other types of unmanned systems might play in support of future MAGTF operations.

Rational: In recent years unmanned aerial vehicles have become widely accepted as a force multiplier and are employed in a myriad of operational and tactical warfighting applications. However, the potential enhancements that unmanned surface and unmanned subsurface systems might bring to the way Marines fight are still largely unexplored. As the Marine Corps looks ahead to the future treats it will likely face and the types of missions it will be called upon to execute, it will be increasingly concerned with minimizing loss of life. The future will likely find the Navy and Marine Corps increasingly conducting operations from a Sea Base and it will become more important for future systems to be compatible with Seabasing.

Questions to be explored:

- How can the capabilities of currently available unmanned aerial systems be better integrated into USMC warfighting functions and future operations?
- What types of unmanned surface and subsurface vessels/systems are currently under development that could be used (with or without modification) to support future MAGTF operations?
- What new types of unmanned systems/capabilities are needed to support future operational concepts?
- What unique opportunities/challenges are created by the need for unmanned systems to be compatible with Seabasing?

4. Historical Analysis of Transition Inflection Points

Commercial: (703) 784-1035 DSN: 278-1035

Description: During *Joint Urban Warrior 08*, participants examined challenges associated with transitioning from a large military presence to a small military presence with a corresponding increase on capability and capacity of the host nation and other elements of the U.S. government. The observation was made by the majority of participants that during this increase in host nation and civilian organization role and capability, it was critical to retain sufficient military over watch to guard against instability. The pervasive insight emerged that a gradual reduction in deployed military force was the method to achieve the desired result by supporting stability while providing graduated reduction in functional over watch for the host government. One senior subject matter expert with experience in OIF asserted that historically large powers often aspired to this sort of gradual de-escalation of military force, but met with no identified success. He made reference to Aden and Algiers. He partially developed the idea by examining the social factors associated with this rapid, systemic shift, including an initial willingness to cooperate with the foreign military coalition, the self-interest associated with so doing, and the gradual realization during the transition that the cooperation that had been beneficial to the indigenous person would become a liability later. This was provided as an explanation for an "inflection point" at which previously cooperating members of the society in question began to engage in public demonstration of independence of foreign coalition influence and desires. This dynamic bears on the challenge facing any militarily significant foreign involvement.

Wargaming Division is interested in insights and observations regarding this phenomena using an examination of historic examples of this 'inflection point' or the absence of such occurrence in order to inform approaches to similar challenges in the future.

- What is the antecedent pattern in conflict regarding this issue?
- What are some chief factors in the dynamic surrounding shifts in decisions bearing on cooperating or obstructing a foreign coalition force in occupation, or post-conflict stability and reconstruction operations?
- How do different approaches to transition fare with respect to achieving a stable shift from occupation to self-governance?

Answers to these questions will bring critical thought to bear in order to enable additional effort to potentially create greater intellectual preparation in conceiving of transitions, planning and executing actions associated with transitions, and communicating to a variety of audiences regarding reason, intention, action and meaning of events pursuant to transition.

5. Emphasizing the “O” in Distributed Operations

Commercial: 703-784-0451

Description: The Distributed Operations concept was originally a US Army maneuver construct that transitioned to the Chairman, JCS operating concept in the early part of the 21st century. Ultimately the USMC adopted elements of the concept to pursue excellent in small unit organization, equipment and training. The program and experimentation has been hugely successful, and is being extended further in a project known as Enhanced Company Operations.

This research paper should build on these constructs and historical examples to examine the potential for distributed operations at the operational level of war, preferably in an amphibious context. The research question is How can the Distributed Operations concept be exploited at the operational level of war to reinvigorate conceptual thinking about amphibious warfare in the 21st century?

6. Exoskeleton Technology

Commercial: 703-784-0451

Description: DARPA and NATICK labs have been developing Exoskeleton technology for the past decade. The USMC has wargamed with the basic capabilities but found power and ergonomic issues too immature for experimentation. What is the status of the technology today, and what are the limitations today, and the expected growth/maturity curves for Exoskeleton technologies?

The USMC has identified two potential operational applications:

a. Strategic Reconnaissance Teams capable of deep interdiction operations with heavier loads, over longer periods of time, and over rough terrain. Using the load bearing capacity of the emerging Lower Extremity model, a strategic reconnaissance team could be inserted much further from its objective area to preclude detection during insertion. With the additional endurance and mobility afforded by the system the team could travel further and farther, without tiring the team when it arrives at a hide site. With the inherent load capacity of the system, the team could bring more water, food, ammunition and batteries to its initial hide site, which could lengthen mission performance, enhance mission capability with added systems, and preclude the need for additional logistics resupply which could compromise the team's position or mission.

b. Urban Combat Teams capable of bringing heavy weapons, more munitions, and self-powered breaching or surveillance systems to city fighting. Exoskeleton clad teams could bring more firepower, greater mobility enhancing systems, and highly advanced force protection/body armor systems to bear than current infantry units. Exoskelton clad teams could use the power of the system's energy pack to operate specially designed weapons for creating holes in walls, clearing rooms, or employing scalable lethal and less than lethal fires. Infantrymen could carry significantly increased forms of body armor. Other team members could be heavy weapons operators, and others could carry additional munitions for the gunners. Other team members could carry special breaching or heavy sensor equipment. Using such equipment, highly trained infantrymen could deftly maneuver through the urban landscape, for longer periods of time, at a higher tactical operational tempo than regularly equipped forces. With the inherent force protection of the additional body armor, and the special access capability to climb walls, scale exterior areas, or just climb steps with the additional gear they carry, an exoskeleton team's tactical mobility could be several times greater than today's level. Furthermore, with the ability to bring sufficient ammunition, special equipment, and supplies upon their backs, the difficulties of urban logistics might be minimized. All told, the capacity of such teams to rapidly penetrate into urban gaps, employ measured firepower, and maintain the momentum of their attack will preclude the traditional difficulties of step by step room clearing, and the cyclical building by building optempo of historical urban combat.

7. Ground Unmanned Systems

Commercial: 703-784-0451 DSN: 278-0451

Description: Compare USMC development plans for unmanned systems and robotics before and after OEF and OIF to present. How have USMC lessons learned impacted plans for the acquisition and employment of unmanned systems? Are USMC acquisition plans adequate, and if not, what should be done? How do USMC concepts and its Marine Corps Vision and Strategy reflect these lessons and the projected capabilities that robots and unmanned capabilities bring? Do major USMC planning constructs, to include the 2015/2024 notional Marine Expeditionary Brigade force structure, adequately address Unmanned programs for the GCE or CSSE? Does the ground advocate have long range plans for acquiring, operating, training and maintaining these systems?

Marine Corps Systems Command

1. Impact of Microsoft Windows Vista Transition on Existing MAGTF C2 Systems

Commercial: 703-432-3842 DSN: 378-3842

Description: Candidate thesis topics will assess and analyze the impact of transitioning fielded Marine Corps systems supporting MAGTF C2 to the Windows Vista operating system.

Given the proliferation of Windows based systems across MAGTF C2 systems, what is the relative likelihood and extent that transition the Vista OS will create interoperability issues for fielded systems? What are the impacts to applications? Hardware? Using a representative sampling of MAGTF C2 applications, what recoding and recompiling efforts could be expected by transitioning the OS of the hosting systems to Vista? What are the implications/comparisons (costs) associated of selected systems transitioning to non-Windows based operating systems (e.g., Linux)? What actions would best maintain or enhance MAGTF C2 capability during operating system migration? What are the anticipated costs associated with recoding?

2. Comparative Analysis of System Engineering (SE) & System of Systems Integration (SoSI) Investment Strategies

Commercial: 703-432-3842 DSN: 378-3842

Description: Candidate thesis nominations will investigate industry, Government, and Department of Defense (DoD) service specific investment management practices as they pertain to SE/SoSI, identify and qualify metric and/or parametric models for determining and supporting investment strategies, and analyze results attained. Research should identify the expected return on investment recognized by programmatic investment in SE efforts and offer best practice recommendations for application by Marine Corps Acquisition.

What are the existing sources and standards for programmatic “best practice” related to SE / SoSI initiative expenditure? How does the existing USMC strategy for SE / SoSI investments compare to industry, government, and sister services? What is the ROI of SE / SoSI investment? Is this applicable within the Marine Corps?

3. Title: C4I Systems Engineering (SE) and System of Systems Integration (SoSI) Gap Assessment

Commercial: 703-432-3842 DSN: 378-3842

Description: Candidate thesis nominations will research potential correlation between the fielding of tactical USMC C4I systems to post-fielding requests for technical assistance, remote and on-site support requirements those requests generate, and unit training.

What trends can be identified from MCTSSA OFTSSC’s records, and additional USMC support activities, that can be used to index post-deployment support requirements for fielded, developing, or future C4I systems? What is the relationship between SE / SoSI investment and/or system complexity and post-deployment technical assistance requirements? How are the existing SE / SoSI gaps related to programmatic risk (cost, schedule, performance)? Using trend analysis, what projections and implications can be made relevant to the current USMC SE / SoSI strategy?

4. Title: Comparative Analysis of Systems Engineering Tools and Data Standards

Commercial: 703-432-3842 DSN: 378-3842

Description: Candidate thesis nominations will conduct a comparative analysis of the various Systems Engineering (SE) architecture support environments, and SE data exchange protocols within industry and the Department of Defense and evaluate SE data portability and standards.

What are the prevailing Architectural Support environments employed to support Enterprise/Systems Engineering within industry and DoD, and comparison between them from the perspective of information exchange? Benefits/concerns? What are the key factors, standards, protocols, or methods to maximize portability of SE Architectural Data and information exchange? What are the available or developing data dissemination models available to exchange information between applications and environments that can be used to create an interoperable data environment?

5. USMC transition to Service Oriented Architecture (SOA)

Commercial: (703) 432-4254 DSN: 378-4254

Description: Describe, from an operating force perspective, how to transition to a Service Oriented Architecture (SOA). A SOA enforces good architecting and engineering principles, such as: modularity, encapsulation, information-hiding, and loose-coupling of components. Through the use of these best practices, SOA promotes interoperability and improves software reusability, maintainability, and reliability. Researchers may address all or portions of this topic area but should remain focused on an overall USMC transition strategy to SOA. This topic area has particular importance to MCSC and will directly impact the USMC as a whole.

6. USMC transition to IPv6

Commercial: (703) 432-4254 DSN: 378-4254

Description: Describe, from an operating force perspective, how to approach IPv6 transition with consideration of coalition interoperability. The available IPv4 address space is finite and will eventually be exhausted. IPv6 is the next internet protocol that will be implemented. The number of IPv6 addresses is exponentially greater than that of IPv4 due to a larger address space. However, the larger address space creates some challenges for low-bandwidth and tactical areas. Researchers may address all or portions of this topic area but should remain focused on an overall USMC transition strategy to IPv6. This topic area has particular importance to MCSC and will directly impact the USMC as a whole.

7. Acquisition Workforce – In-source or Outsource?

Commercial: (703) 432-3023 DSN: 378-3023

Description: The increasing demands on the acquisition workforce have often resulting in outsourcing of acquisition related functions. In light of recent legislation (Section 814 of the FY2006 National Defense Authorization Act), there is a move to undertake a thorough review of acquisition structures and capabilities, which includes military, civilian AND contractors. The goal is to ensure there are no obvious gaps in capability, and that we are using the best mix of resources to accomplish our DoD missions, while being mindful of inherently government functions and the relative costs of each type of resource. DoD is trying to document the as-is state with respect to acquisition workforce, which is difficult with respect to contractors, due to the move toward performance-based contracting and it's limited focus on capturing labor hours/Contractor Workforce Equivalents (CWEs). The question to be researched would be what is the right balance of resources (i.e. insource vs outsource) (or the best methodology for determining the right mix including cost impacts/benefits and pros/cons), and what is the best

method for approximating CWEs across all services, in light of limited data and service-specific processes currently in place.

8. Creating NGEN Contract Using NMCI Lessons Learned

Commercial: (703) 432-3784 DSN: 378-3784

Description: The advantages and disadvantages of the current IT contract with NMCI is important topic and should to be addressed by both the Navy and the Marine Corps. The NMCI contract was first awarded almost 10 years ago and has, since that time, been the provider of all IT software and hardware in these organizations. Research regarding the actual contracting procedure and the function of NMCI for the duration of the contract should lead to the discovery of actions that were taken, why they were taken, and what the result have been. Results of such a study could lead to better products and services than those provided by the current contractor. What should be included in the NGEN contract and what should be avoided may surface in a close examination of the NMCI contract. Issues raised through studying the examination results could be valuable if they are used as lessons learned when creating the new NGEN contract. As NMCI has failed to keep ahead of the technology curve creating the lack of, or extremely slow communications and Internet use, this research might assist the Navy and Marine Corps to procure a product that is superior to what is currently mandated for use.

9. The impact of The Fuel Efficiency Demonstrator Program (FED) on tomorrow's MAGTF

POC: Director Science and Technology PEO Land Systems
Commercial: (703) 432-4956 DSN: 378-4956

Description:

The Fuel Efficiency Demonstrator Program (FED) was initiated by OSD to address energy conservation needs highlighted by the Defense Science Board Energy Security Task Force. The overarching goal of the program is to improve military vehicle technology to reduce fuel consumption on the battlefield, and reduce our dependence on oil.

The technical objectives of the FED are:

- Demonstrate a tactical vehicle with significantly greater fuel economy than the M114 HMMWV, while maintaining tactical vehicle capability.
- Integrate emerging fuel efficient technologies to demonstrate potential capabilities for the next generation of military trucks.
- Consider higher risk/higher payoff technologies to attain the most fuel efficient vehicle possible.

Potential technologies and innovations could occur in areas such as Propulsion, Driveline improvements, Weight reduction and structure/frame, Lightweight components, and Integration.

Rationale: How will meeting Fuel Efficiency goals on the order of 25% of today's consumption rates be effectively leveraged across a recapitalized MAGTF? What type of second and third order effects will result in regard to ground maneuver rates and force sustainment requirements, and how might they help expand our expeditionary capability? What are the future force implications when framed against DOTMLFP(P)?

10. Applying the technologies of aviation fuel containment and fire suppression systems to the ground vehicles of today and tomorrow: How will increasing survivability effect capability?

POC: Director Science and Technology PEO Land Systems
Commercial: (703) 432-4956 DSN: 378-4956

Description:

For years the aviation community has addressed fuel system design as a key factor in aircraft safety and survivability. Self-sealing tanks, breakaway fittings, and ballistic protection in critical areas are all common in most military aircraft. The MV-22B also employs an onboard inert gas generation system (OBIGGS) which supplies nitrogen-rich air to the wing and sposon tanks as fuel is depleted, displacing fuel vapor, and reducing the possibility of fire. Do these technologies have application to tactical ground vehicles, or will the cost, weight and complexity detract from mission capability. (payload/range etc.)

Rationale:

How can the analysis and application of aviation fuel containment and fire suppression technology best be leveraged in support of ground combat vehicles? What metrics will best support survivability comparisons to potential reductions in vehicle range and associated payload? Do technologies used in commercial transportation or the automobile racing industry for fire suppression have application to tactical vehicles?

11. Advanced Development of Marine Corps Vehicle M&S Vignettes for use in ADAMS Mobility Models

POC: Director PM LAV, MPC Director of Engineering
Commercial: (586) 574-9090 DSN: 786-9090

Description:

The current Army/ Marine Corps standard for M&S evaluation of mobility requirements uses the NATO Reference Mobility Model (NRMM). This modeling tool does not reflect the current mission profiles in detail to determine accurate results. There is a current effort at MCCDC with the aid of Nevada Automotive Test Center (NATC) using the dynamic simulation tool, ADAMS, to develop mission profiles for both the Marine Personnel Carrier and the Joint Light Tactical Vehicle. These newly developed mission profiles can be utilized to demonstrate the mobility capabilities of various Marine Corps vehicles. Once these profiles have been created for ADAMS analysis, further research could start with the development of specific ADAMS Vignettes to describe various missions. Use these Vignettes with the ADAMS profiles to compile a data base; this data base could be utilized to analyze the mobility capabilities of each Marine Corps Vehicle in specific missions. This capability could help define mobility gaps and methods of vehicle deployment in a variety of mission scenarios.

Rationale:

Currently until a vehicle is tested at a test facility or in theatre are accurate mobility characteristics known. Currently predicted mobility results are weak when using the NRMM tool the ability to predict accurate mobility for Marine Corps vehicles will greatly improve with ADAMS based analysis. The research into various scenarios could help add early definition into the mobility capabilities of the entire fleet of vehicles in a variety of situations. The overarching questions that will be answered through this research are: What are the Marine Corps vehicle mobility capabilities in various worldwide mission scenarios and what gaps in mobility exist within the current or planned fleet of vehicle".

12. Research into defining In Land swim/Fording capabilities.

POC: Director PM LAV, MPC Director of Engineering
Commercial: (586) 574-9090 DSN: 786-9090

Description:
The Marine Corps does not have a specification for In Land Swim requirements. Vehicles with an In Land swim/ford capability can navigate robust mission profiles by adding to the area the vehicle can negotiate, thus expanding its mission profiles. Currently there are no specific requirements detailing requirements for negotiating shoreline ingress/egress conditions or mapping these conditions to specific terrains.

Rationale:
Research could answer the questions "What is the specification requirement for Marine Corps vehicles to negotiate In Land water obstacles and what mission terrain can be traversed in planning out mission operations.

13. USMC Projections, Enterprise Architecture and Planning for the Sustainment Common Operating Picture (S-COP)

Commercial: (703) 432-4245 DSN: 378-4245

Description: How will the Marine Corps support future logistics data requirements for the tactical logistics Common Operating Picture (COP) within the structure of the Global Information Grid (GIG) and NetOps Net-Centricity? Specifically, the emergence, increasing use and dependency upon condition-based Autonomic Logistics reporting, embedded Automatic Identification Technology (AIT), supply chain Radio Frequency Identification (RFID) and Item Unique Identification (IUID) will enhance the information advantage element of national power. In order to enable the battlefield, national and worldwide enterprise logistics view in near real-time, an analytical study is necessary to define the future architecture and bandwidth necessary to support the projected data networking, data storage, Satellite capabilities and integrated software requirements. Additional considerations include: LAN, WAN, MCEN, NMCI, Nodes/NOC, RF Spectrum, IT supportability, Electromagnetic Environment, IPv6, Tactical Data Links, Information Assurance. This assessment should support the Global Information Grid 2.0 Capstone Capability in order to ensure that logistics, supportability and the supply chain are identified and competitive with other users and limited bandwidth availability. Researchers may address all or portions of this topic but should focus on an analysis of the notional equipment, software and bandwidth necessary for Marine Corps tactical equipment Sustainment COP. This topic area should be considered as important to Marine Corps future operations.

14. Lighten the Load

Commercial: (703) 432-3377 DSN: 378-3377

Description: Marines currently carry a minimum, and often in excess of 90 lbs of equipment. MIL-STD 1472F provides guidelines on total weight carried by an individual for close combat and marching operations. Past, present, and future efforts continue to focus on equipment weight reductions as the optimal mechanism to achieve reduce weight, though efforts to date have only achieved small, incremental reductions. Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities (DOTMLPF), Training, Tactics, and Procedures (TTPs), Squad as System, Concept of Operations, and equipment analysis should be conducted to determine mechanisms to effectively reduce the overall weight on dismounted Marines. While Technology Materiel solutions such as robotic and load carriage systems should be analyzed, weight reductions may be more effectively realized through other areas such as alterations to current DOTMLPF, TTP,

and Concept of Operations. This topic has far reaching implications on the lethality, survivability, sustainability, general health and morale, and other aspects for dismounted Marines.

15. Analysis of wireless employment within the Combat Operation Center

POC: MARCORSYSCOM, PG-11, MC2S, COC Program
Commercial: (703) 432-4162 DSN: 378-4162

Background:
The Combat Operations Center (COC) is an operations facility utilized at multiple echelons to execute command and control functions. The system supports SIPRNET, NIPRNET and coalition networks through hard wired ports. The fleet has indicated that a wireless capability would be beneficial but has not been able to precisely articulate what the true benefits of implementing a wireless network would be. This research would review operations within a COC to determine wireless opportunities, identify wireless candidate solutions and assess the impacts of current information assurance policies and directives applied towards the candidate solutions on the tactical battlefield.

Points:
The MC2S Lead engineer intends this research to address the following points.

- Identify operational utility of wireless in and around the COC on the move, COC to antenna hill and COC to COC
- Identify current and near term wireless solutions suitable for tactical employment
- Identify current wireless information assurance policy for tactical employment
- Assess operational effectiveness of implementing top 2 wireless candidates as applied towards in and around the COC, on the move, COC to antenna hill, COC to COC

Intelligence Plans & Policy Branch

1. Alternative organizational structure for operational-level staffs engaged in COIN and C-IED operations.

Commercial: (703) 693-5424 DSN: 555-1212

Description:
Although Marine forces have conducted Counter-Insurgency (COIN) operations for more than six years, there has not been a comprehensive evaluation of the organization, structure or functions of the intelligence enterprise that has evolved to support these operations. Intelligence unites have developed ad hoc organizations and procedures to keep up with the enormous work load the COIN environment presents. Formal changes within US intelligence units however, have focused on the technology of collection, not on the organization of intelligence forces themselves.

Operations in OIF and OEF have demonstrated that in nearly every facet of COIN and unconventional warfare (UW), intelligence is the factor and the input in all phases from decision making to execution and consolidation, to exploitation.

UK model of Tasking and Coordination Group (TCG) provides a useful baseline from which to develop a larger organizational construct for intelligence forces facing COIN and UW.

Rationale: In COIN and unconventional warfare (UW) the old mantra of intelligence drives operations has proven insufficient.

Field based experience has shown that in fluid war fighting environment where crime and war are blurred and new ethos required: Intelligence in support of Operations.

Marine Corps Intelligence Activity, Analysis Directorate

1. The effects of long term embargo on the maintenance of Iraqi critical infrastructure.

Commercial: (703) 432-7206 DSN: 378-7206

Description:
An examination of the effects of the long-term UN embargo and sanctions on Iraqi critical infrastructure, specifically the oil production/refinement/distribution networks.

Rationale:
The paper will provide an in depth study that focuses not just on a detailed examination of the degradation of Iraqi critical infrastructure (POL focused, but also including power grid, road network, industry, commerce, etc) but also on the ways to rehabilitate and reconstruct infrastructure in the aftermath of such and embargo. By examining this historical example the paper will provide insights into the expected utility of sanctions as well as offer indications of likely problems for future post-conflict development within countries that have suffered under like conditions.

2. Lesson's of Counterinsurgency in Latin America

Commercial: (703) 432-7111 DSN: 378-7111

Description:
Paper will examine historical and current Counterinsurgency (COIN) lessons from Latin America with a particular focus of possible application within the current conflict in Afghanistan.

Rationale:
The breadth of possible COIN conflicts within Latin America over the past century provides significant material for exploration. Within the current context there are many different angles and approaches, including the drug-fueled aspect of the FARC insurgency; training, expansion, and doctrinal evolution of Colombian military forces to counter the FARC; and issues involving the use of neighboring countries as safe havens that could be examined for possible application to the similar attributes of the current insurgency within Afghanistan.

3. Natural resource overreliance effect on economic and political infrastructure.

Commercial: (703) 432-7206 DSN: 378-7206

Description:
Paper will examine how overreliance on a natural resource (Dutch disease) can lead to underdevelopment of both the economic and political infrastructure of a state.

Rationale:
This is particularly relevant to Middle Eastern states that have oil/natural gas based economies and have not been able to develop into democracies because large portions of the population receive tangible benefits from the autocracy in the form of limited to no taxes and generous subsidies, thus limiting the demands placed on the government by its citizens. This also has the unintended consequence of the state not developing into a more industrial export economy because they basically do not have the need. There has been substantial academic work into what happens next when the state runs out of the natural resource, or when it becomes less in demand.

4. Columbia's experience with Counterinsurgency and evolving democracy.

Commercial: (703) 432-7111 DSN: 378-7111

Description:
Paper will examine Columbia's experience waging Counterinsurgency (COIN) while also attempting to cultivate democracy.

Rationale:
The paper will provide a deep study of Columbia's experience with waging COIN against the narco-fueled insurgency while also examining the pitfalls the democracy encountered. An analytic case study comparing the Columbian experience and democratic growth under President Uribe could be made with Peru's experience's under Fujimori.

5. Title: Pakistani and Indian Military Issues and Development

Commercial: (703) 432-7206 DSN: 378-7206

Description:
Paper will compare the military issues and development of both Pakistan and India with a focus on how the perceived threat of the other country shapes decision making in that regard.

Rationale:
Both nuclear armed parties have significant impact regionally and globally, the paper will examine both Pakistan and India's military capability, acquisitions, force structure and other key attributes. The paper will also further identify Pakistani military concerns with regard to India and vice versa. It will also identify short-term and long-term initiatives Pakistan is undertaking to enhance their military capability in comparison with that of India's initiatives in the same regard.

6. Natural resource overreliance effect on economic and political infrastructure

Commercial: (703) 432-7206 DSN: 378-7206

Description:
Paper will examine how overreliance on a natural resource (Dutch disease) can lead to underdevelopment of both the economic and political infrastructure of a state.

Rationale:
This is particularly relevant to Middle Eastern states that have oil/natural gas based economies and have not been able to develop into democracies because large portions of the population receive tangible benefits from the autocracy in the form of limited to no taxes and generous subsidies, thus limiting the demands placed on the government by its citizens. This also has the unintended consequence of the state not developing into a more industrial export economy because they basically do not have the need. There has been substantial academic work into what happens next when the state runs out of the natural resource, or when it becomes less in demand.

7. Communications Technology Proliferation in Iraq since the fall of the Saddam Regime

Commercial: (703) 432-7206 DSN: 378-7206

Description:
An examination of rapid expansion of technology within the communications infrastructure of Iraq since the fall of the regime, with a particular focus on cellular and internet expansion.

Rationale:
The paper will examine the dynamic switch within Iraqi society from a censored and controlled population to one with a significant lack of regulation and rise in commercial technology proliferation. Study will focus on, but not be limited to, the advent of cellular networks-and competition within different providers-as well as the proliferation and usage of the internet. Aside from the documentation of the proliferation of infrastructure the paper will also delve into how the Iraqi society uses these aspects of communication with newfound freedom.